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ABSTRACT

The relationship between agricultural extension agents and wheat farmers in the Medina region, Saudi Arabia, was analyzed, based on each group's perception of the relationship. Participants were 73 randomly selected wheat farmers and 31 of 34 agricultural extension agents working in the region during spring 1990. Farmers were interviewed, and extension agents were given questionnaires. The following statistical tests were used to analyze data: frequencies, means, standard deviation, percentages, correlated t-test, Spearman correlation, and chi-square test. Findings indicated that extension agents did not perform the role of demonstrator at the level farmers expected. Most farmers preferred neighbors as sources of agricultural information. Farmers who adopted farm practices examined in the study were those who had higher education, had studied agriculture, and had a large amount of land in wheat production. There was no association between 7 of the 12 sources of information used by farmers and extension agents, and farmers used the sources to a greater extent. Farmers perceived their relationship with the extension agent as only slightly beneficial at best. Findings implied that extension agents should give small landholding farmers more attention, identify and work closely with opinion leaders, and learn and transfer information. Recommendations for the extension system and for further research were made. (75 references) (YLB)

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EFFECT OF THE RELATIONSHIP BETWEEN AGRICULTURAL EXTENSION AGENTS AND WHEAT FARMERS IN MEDINA REGION, SAUDI ARABIA, ON THE ADOPTION OF APPROPRIATE WHEAT PRODUCTION PRACTICES

A Summary Report of research

by

Mohammad Saleh Bakri

U.S. DEPARTMENT OF EDUCATION
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FOREWORD

What some change agents believe that they need to do in order to establish a good working relationship with the people with whom they work may or may not be consistent with what those people believe agents should do to establish that effective relationship. Sometimes people can be blind to the effect that roles followed or activities carried out have on that relationship.

Research on the effect of the relationship between agricultural extension agents and wheat farmers on the adoption of appropriate wheat production practices conducted by Dr. Mohammad S. Bakri and summarized herein provides insights and guidance specifically for two groups of people: (1) administrators and curriculum developers of colleges of agriculture in the Kingdom of Saudi Arabia and (2) administrators and training directors in the extension services of the Ministry of Agriculture and Water of Saudi Arabia.

However, even though the findings, conclusions, implications, and recommendations apply only to one part of Saudi Arabia, and cannot be generalized to other settings and countries, they provide food for thought (1) for people developing curricula for agricultural schools, (2) for those conducting pre-service and in-service training programs for extension personnel and (3) for those responsible for administering or supervising such educational and extension programs.

Dr. Bakri established 13 objectives to examine the effect of the relationship between extension agents and farmers. People in positions such as those above might pay especial attention to the findings concerning (1) what farmers perceived to be the roles expected of extension agents when compared with what extension agents perceived to be their roles, (2) whether or not farmers believed the recommendations of extension agents, and (3) the differences in the sources of information farmers said that they used to learn about new wheat production practices and those sources or techniques that extension agents said that they used to help farmers learn about approved production practices.

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EFFECT OF THE RELATIONSHIP BETWEEN AGRICULTURAL EXTENSION AGENTS AND WHEAT FARMERS IN MEDINA REGION, SAUDI ARABIA, ON THE ADOPTION OF APPROPRIATE WHEAT PRODUCTION PRACTICES

Introduction

The most impressive accomplishment in Saudi agriculture over the past 15 years has been the big increase in production of wheat. Wheat production in 1977 totaled a modest 3,000 tons. The 1984 harvest of 1.3 million tons represents an increase in wheat production of almost 1,000 percent (Ministry of Agriculture and Water, 1989).

Saudi Arabia has exported wheat to 30 countries, including China, the Soviet Union, nations of the European Economic Community, Indonesia, South Korea, Sri Lanka, and various Arab countries. In addition, the government has increased its silo capacity to 2.5 million tons (The Royal Embassy of Saudi Arabia to the United States, 1989.)

Saudi Arabia became self-sufficient in wheat production in 1984 and continues to be so. These advances in wheat production in Saudi agriculture resulted in the Ministry of Agriculture being awarded a certificate of merit in 1984 by the Food and Agriculture Organization (FAO) of the United Nations.

In addition to wheat, agricultural production has been increased significantly in many other crops such as fruit, vegetables, and dates. Self-sufficiency in dairy products was also achieved by 1983. Saudi Arabia is considered to have the largest number of dairy farms in the Middle East. Many projects already existed in Saudi Arabia at the time of this study in poultry, fisheries, and livestock production to meet the rising demand for meat. Agriculture's share of the Kingdom's gross domestic product climbed from 3 percent in 1979 to 13 percent a decade later, and has reached even higher levels today.

Agricultural education first started in Saudi Arabia in 1964 at the intermediate level (after the sixth grade) (Al-Shenaifi, 1983). There

were five intermediate schools that admitted students after their graduation from elementary schools. By 1969 the intermediate schools were closed and one secondary school was opened. The secondary school was also closed in 1976 and a new agricultural institute at the secondary level was opened in 1977-1978 (Al-Shenaifi, 1983). There are now five agricultural institutes scattered throughout Saudi Arabia. These institutes help in increasing agricultural production.

Extension work is relatively new to the farmers of Saudi Arabia, having been started in 1964. The Department of Extension has grown in size and operation to cover all regions of the country. Today, as Saudi agriculture works to meet the demands of agricultural development, the Ministry of Agriculture and Water is represented by 15 Agricultural Directorates and more than 100 offices throughout the country. Agricultural extension agents are housed in those offices.

Two major problems face the extension service in Saudi Arabia, namely, the quantity and quality of its personnel. The number of extension workers relative to the number of farmers is inadequate. Extension workers are graduates of the colleges of agriculture or the agricultural institutes. Both of these programs provide a background in natural science and technical subject matter such as agronomy, entomology, soil science, horticulture, and animal science.

The typical procedure used by agricultural extension personnel in Saudi Arabia as described by Al-Odaibi (1983) is as follows:

1. A new variety of crop is proven by ministry officials to be applicable to the local conditions.

2. Extension workers are given orientation to the crop's requirements.

3. A publicity program is initiated through mass media to farmers.

4. The local extension workers select demonstration plots on certain farms.

5. Farmers are invited to observe the demonstration.

6. Extension workers prepare a descriptive report of the demonstration process.

As shown above, the program process is a one-way process of decision making and implementation from the top down. Most extension programs are predetermined by higher officials and implemented by the local extension workers. Farmers are seldom consulted or included in the planning stage.

Background Information about the Medina Region

The Ministry of Agriculture and Water is represented by 15 general agricultural directorates. Medina is one of these directorates and contains eight branches. The Medina region has been one of the important agricultural districts in Saudi Arabia. Farming in this region is dependent on irrigation. The principal crops are dates, alfalfa, vegeta-bles, grapes, citrus, and wheat. There are many towns and hundreds of villages in this region.

Farmers in the Medina region, as well as other farmers in the Kingdom, were encouraged to grow wheat as a result of government support. According to the Annual Report of Medina Region of Agriculture in 1989, about 510 farmers participated in wheat production. The total area used for wheat production was about 70,034 donums (1 hectare = 10 donums) and total wheat production was about 27,675 tons. The total number of sprinkler irrigation systems was 134. The Directorate of Medina region distributed 1,915 tons of wheat seed to the farmers in 1988 (Directorate of Agriculture and Water of Medina, 1989).

Statement of the Problem

Increases in Saudi Arabia's agricultural production must come primarily from the adoption of more productive and appropriate agricultural practices by a large number of farmers. Agricultural extension agents will play a major role in affecting adoption of appropriate technology among those farmers if they are able to win the

trust of their clientele. In doing so, extension agents will influence the possible anticipated consequences of such adoptions. There have been large numbers of research studies about the adoption of modern agricultural technology in the United States, other developed countries, and in some developing nations, such as India. Unfortunately, few studies have been completed in Saudi Arabia.

Large-scale adoption of recommended farm practices is essential to increase the output in farming. To be effective in this process, one must know what techniques and influences can be used effectively during stages of adoption.

Another important and timely factor is the fact that the current economic situation in Saudi Arabia makes it possible to introduce and apply the most current and recommended agricultural practices if these practices are appropriate for the clientele involved. The problem, however, is that these practices are not being adopted by the farmers as quickly as might be possible. It is not known if the working relationship between farmers and extension agents might be one reason for this situation. The findings of this study should help extension agents in the Medina region of Saudi Arabia to persuade traditionally oriented farmers to change from their traditional ways and accept new ideas and practices recommended by specialists at experimental stations in the region and over the Kingdom, if these ideas and practices are appropriate.

Purpose and objectives of the Study

The primary purpose of this study was to analyze the relationship between agricultural extension agents and wheat farmers in the Medina region, Saudi Arabia and its effect on the adoption of appropriate wheat production practices. The following objectives were established to achieve this purpose:

1. To describe wheat farmers and agricultural extension agents in the Medina region, Saudi Arabia, with respect to selected demographic variables.

2. To compare what agricultural extension agents perceived to be their current role with what they perceived to be their ideal role.

3. To determine the perception of agricultural extension agents concerning their expected role as extension agents.

4. To determine what wheat farmers perceived to be the roles expected of agricultural extension agents.

5. To determine if differences existed between the two groups with respect to the perception of roles expected of agricultural extension agents.

6. To determine if wheat farmers believed the recommendations of agricultural extension agents concerning farming practices.

7. To determine if agricultural extension agents were considered capable of helping wheat farmers effectively.

8. To determine the relationship among the selected demographic variables of agricultural extension agents' major field of study, level of formal education, years worked as extension agent, years worked with wheat farmers, and experience in farming, before they started their present jobs.

9. To determine the relationship among selected demographic variables of wheat farmers' age, literacy, level of education, study of agriculture, years in farming, farm size, amount of land operated for wheat production, and the degree to which wheat farmers adopted the wheat production and management practices recommended by agricultural extension agents.

10. To determine if the opinions of wheat farmers about agricultural extension agents were associated with the adoption of wheat practices by those farmers.

11. To gain insight into farmers' perception of their innovativeness.

12. To determine if an association existed between the sources of information wheat farmers said they used and those that agricultural extension agents said they recommended to help wheat farmers learn about approved wheat production practices.

13. To determine if wheat farmers perceived that the relationship between themselves and agricultural extension agents had been beneficial to wheat farmers.

Significance of the Study

Increasing levels of agricultural production and social growth among farmers in any place in the world depend on the ability of those farmers to undertake and support that growth. In this case the extension workers who work closely with farmers should be able to transfer to those farmers quality services according to the farmers' needs and interests. It is true that the effectiveness of efforts in agricultural development involving external extension agents depends on having successful relationships between extension agents and farmers.

Perceptions of one group about the other can affect favorably or unfavorably those relationships. Unfortunately, in the case of the wheat farmers and extension agents in the Medina region, those perceptions and resulting relationships are not well understood. Therefore, this study provides information necessary for wheat farmers and agricultural extension workers to understand each other. Hopefully,

this will result in faster and greater acceptance of improved wheat production practices by farmers.

Delimitations

This study was delimited to a random sample of 73 wheat farmers from a population of approximately 510 farmers and the population of 34 agricultural extension agents working in the Medina region of the Kingdom of Saudi Arabia during the spring of 1990.

Basic Assumptions

For the purpose of this study, the following assumptions were made:

1. The farming practices examined in this study did not necessarily include all of the practices most important to increasing levels of wheat production. However, the practices examined were needed by farmers in the Medina region.

2. The agricultural extension agents and the farmers were willing to respond candidly to questionnaires and interviews.

Limitations

It was recognized that certain factors and conditions could possibly limit the usefulness of this study. The results reported herein apply to the agricultural extension agents and the sample of wheat farmers with whom they worked in the Medina region of Saudi Arabia. Other factors, such as level of training of extension agents or type of assistance provided to farmers, may exist. Those factors may affect the perceptions and relationships of agricultural extension agents and their clienteles in other areas. Therefore, it is recognized that the results of this study may not be generalized to other areas, possibly inside and definitely outside of Saudi Arabia. It was recognized also that the position of the investigator and his relationship with the

agricultural extension agents could have biased the responses of those agents, though every effort was made for that not to happen.

Definition of Terms

Specialized terms used in this report are defined as follows:

Agricultural extension workers:

Individuals who are employed by the Ministry of Agriculture and Water in Saudi Arabia to work with farmers to transfer technology.

Donum:

1,000 m^2 (0.1 hectare; 0.25 acres).

Research Procedure

This section describes the methodology that was used. It presents the design, the development of instruments, pilot studies undertaken, a description of the population, procedures used for collection of data, and analyses of the data.

Design of the Study

One independent variable for this study was "job": either farmers growing wheat or the agricultural extension agents working in the region. The dependent variables for wheat farmers were: age, name of village, literacy, years completed in formal education, years spent in farming, farm size, size of land operated for wheat production, agricultural implements owned by the farmer, and the usual source of information concerning farming practices. The dependent variables for extension agents were: age, professional job title, highest level of formal education, years served as an extension agent in agricultural service, years served as an extension agent with wheat farmers, major field of study while in school, father's occupational experience, and involvement with wheat farming other than in the present job.

Instruments

An interview schedule was developed by the investigator to be used with wheat farmers and an questionnaire was developed to collect data needed from extension agents. The interview schedule for wheat farmers contained three sections. The first section was designed to obtain general information about the respondent wheat farmers. The second section was constructed to determine the extent to which farmers were adopting approved farm practices. The third section was designed to determine the opinion of wheat farmers about extension agents who had worked with them.

The questionnaire designed for extension agents also contained three sections. The first section was designed to obtain general information about the respondent extension agents. The second section was designed to determine what extension agents perceived to be the current and ideal roles that should exist between themselves and their farmer clientele. The third section was designed to determine the activities followed by extension agents to carry out the current roles and to establish an ideal relationship with wheat farmers.

Pilot Studies

Two pilot studies were conducted in order to establish the validity of the instruments used in this study. The first was conducted with four agricultural extension agents from Jeddah Agricultural Experimental Station, Saudi Arabia, who graduated from schools in the United States. This pilot test was done before translating the questionnaire into the Arabic language.

The second pilot study after the translation of the instrument into the Arabic language was conducted with three extension agents from the same experimental station. The purpose of the pilot studies was to discover if there were problems in translating or in understanding the instruments. Changes suggested were incorporated into the instruments actually used.

A pilot study was not undertaken to check the content of the interview schedule for validity and reliability. However, the investigator's graduate advisory committee reviewed the schedule and as did a professional extension agent in the Medina region before it was used.

Population

The population for extension agents in this study consisted of all 34 agricultural extension agents in the Medina region, Saudi Arabia. Three extension agents did not return the questionnaire. Therefore, data were collected from 31 agents for a 91% rate of return.

The population of wheat farmers consisted of the 510 wheat farmers in the Medina region who received subsidies from the Ministry of Agriculture and Water. The sample consisted of 83 of those wheat farmers who received subsidies selected from 16 different villages in the Medina region. Ten wheat farmers did not wish to participate in the study. Those 73 wheat farmers who responded (88%) were selected from 16 different villages.

The investigator faced some problems in selecting villages because of a shortage of transportation. However, the investigator did his best to select some farmers from villages from each of the different kinds of wheat production areas. The greatest number of wheat farmers selected from a single village was nine farmers (Aljadida and Alnikail). Six wheat farmers were selected from each of four villages. However, farmers from some villages from each of the different kinds of wheat producing areas were chosen according to ease of accessibility and the probability that the farmers in those villages would be representative with respect to the demographic and personal variables examined in the study.

Data Collection

The investigator traveled to Saudi Arabia on December 27, 1989 to collect the data. Interviewing was conducted with wheat farmers on their farms or, in some cases, in their work places away from the farm. Farming in some areas is handled mainly by foreign workers and their farm owners visit the farms only occasionally.

The questionnaires for agricultural extension agents were given to them after meeting with them in the office of the Medina Directorate of Agriculture and Water. The investigator explained all the parts of the questionnaire in detail to the agents before agents were asked to complete it.

Analysis of Data

All of the respondents, whether wheat farmers or extension agents, completed all of the questions. Appropriate statistical tests were used to analyze the data in this study. First, frequencies, means, standard deviations, and percentages were used to describe wheat farmers and agricultural extension agents with respect to selected demographic variables. A correlated t-test was performed to compare what agricultural extension agents perceived to be their current and ideal roles. A Spearman correlation was used also to determine the relationship between selected demographic variables of wheat farmers and the degree to which those farmers adopted wheat production and management practices recommended by extension agents. Also, a chi-square test was performed to examine the association between the sources of information used by wheat farmers and sources used by agricultural extension agents. These data were analyzed using the Statistical Analysis System (SAS) in the Texas A&M University mainframe computer system.

Research Findings

Readers are encouraged to examine the original report of research if they are interested in findings presented in tabular form or wish to examine the instruments used.

Findings Related to Objective One

Objective one was to describe wheat farmers and agricultural extension agents with respect to selected demographic variables. For wheat farmers, the average age in years was 47.6. Among those farmers, 50.7% (38) were 49 years old or younger and only 9.6% (7) were 59 years or older. Those wheat farmers were selected from 16 different villages.

Thirty-five percent (26) of the wheat farmers were illiterate while 30% (22) had not entered high school. Only 8.2% (6) of the wheat farmers held a college degree. The average number of years of formal education was 5.7 years.

The average time the wheat farmers had been in farming was 16.7 years. Only 12.3% (9) of the wheat farmers had more than 30 years in farming and 38.4% (28) had ten years or less in farming.

The average farm size was 478.7 donums. Fifty percent of the wheat farmers (37) operated 300 donums or less. Only 7% (5) operated more than 1,000 donums.

The average size of area in wheat production was 298.7 donums, while 73% (53) of the farmers operated no more than 300 donums. Five and one-half percent (4) operated more than 1,000 donums.

The study showed that 31.5% (23) of the wheat farmers owned none of the six agricultural implements included in the survey. Those implements were the plow, cultivator, leveler, combine, tractor, and sprinkler. Only 8.2% (6) owned all implements. The wheat farmers who did not own specific pieces of equipment ranged from 33 to 81%.

It was found from this study that 83.6% of wheat farmers preferred to have neighbors as their sources of agricultural information. Seventy-five percent (55) agreed that they got some information from agricultural extension agents.

The average age in years for extension agents was 36.5. Among them 83.9% (26) were 44 years old or younger. About 61.3% (19) were 36 years old or younger.

Three main jobs titles were held by all extension agents and each agent indicated holding one to three different job titles. Nineteen agents were in agricultural extension, 11 in plant protection, and 18 in agricultural economics.

There were three kinds or levels of education held by extension agents. Seventy-four percent (23) held a college degree, 13% (4) held a high school diploma, and 13% (4) held an intermediate level certificate.

The study showed that 19.4% (6) of the extension agents had worked one year or less with farmers as general agents, 9.7% (3) had worked two to five years, 22.5% (7) had worked five to nine years, and 48.4% (15) had worked ten years or more. Also, it was found that 61.3% (19) of those agents had worked one year or less with wheat farmers, 12.9% (4) had worked two to four years, 16.5% (5) had worked five to nine years, and only 9.7% (3) had worked ten years or more with wheat farmers.

Nine different major fields of study were represented among the respondent agents; an agent could have studied more than one field of study. Seventeen of those 31 agents studied general agriculture. Only one agent studied agricultural extension as a major field of study.

The occupations of fathers of extension agents was surveyed. It was found that 29% (9) of them had worked as farmers, 29% (9) as

businessmen, 22.6% (7) as government employees, 3.2% (1) as a private company employee, and 16.1% (5) in other occupations.

Concerning extension agents' experience with farmers in general before beginning their present jobs, 74.8% (23) had no prior experience while 93.5% (29) had no experience with wheat farmers in particular.

The study showed that 19.4% (6) of the extension agents were presently farming besides doing their present jobs. The other 80% (25) were not involved with farming.

Findings Related to Objective Two

Objective two was to compare what agricultural extension agents perceived to be their current and ideal roles. Twenty-nine current and ideal roles of agents were divided into five categories. Those categories were teacher, communicator, researcher, developer, and administrator.

A correlated t-test was performed to compare current and ideal roles of extension agents. The results showed that the means between current and ideal roles were not significantly different except for one role under the category of developer (develop extension teaching methods) and one role under the category of communicator (prepare radio program to disseminate information). However, the current roles had higher means than the ideal roles in 17 cases while the ideal roles were higher than current roles in 11 cases.

Findings Related to Objectives Three, Four, and Five

Objectives three, four, and five were to determine if differences existed between the wheat farmers and agricultural extension agents with respect to the perception of roles expected of agricultural extension agents. In order to analyze the data relating to those questions, analysis of variance and t-tests were performed. Both

groups of wheat farmers and extension agents were asked about 14 roles carried out by agricultural extension agents.

The means of wheat farmers were higher than the means of extension agents in nine roles expected of agents. Those were catalyst, answer giver, facilitator, evaluator, demonstrator, supervisor, publicizer, experimenter, and preventer. However, the means of extension agents in the other five expected roles were higher than the means of wheat farmers. Those five were legitimizer, technical expert, listener, deflector, and visitor.

The unexpected result among these 14 roles was the finding for the role of demonstrator. One would expect extension agents to score higher on this item. Instead, the results showed that the mean of wheat farmers was higher than the mean of extension agents.

Findings Related to Objective Six

Objective six was to determine if wheat farmers believed the recommendations of agricultural extension agents concerning farming practices. Six variables were examined to find out the result, five of which were general Likert scale opionionnaire items. The means ranged from 3.03 to 4.34.

The sixth variable was finding out if the farmers reported following the recommendation of the extension agents on the amount of water to be applied to wheat. Slightly more than one-half (53.4%) reported that they did not follow the recommendation of the extension agents.

Findings Related to Objective Seven

Objective seven was to determine if agricultural extension agents were considered capable by wheat farmers of helping those farmers effectively. Ten capability items were used to make this determination. The respondents were asked to rank their answers in a Likert scale from "1" meaning strongly disagree to "5" meaning strongly agree.

The lowest mean among these ten items was 3.77 for the item "the current agents have more experience than the other who worked before. The highest mean was 4.67 for the item "farmer is willing to have the agricultural extension agents conduct a demonstration field on his farm." However, six items had means above 4.0 while four items had means lower than 4.0.

Findings Related to Objective Eight

Objective eight was to determine the relationship among the selected demographic variables of agricultural extension agents' major field of study, level of formal education, years served as extension agent, years served as extension agent with wheat farmers, and experience in farming before they started their jobs.

Sixty-one percent of the extension agents had some level of preparation in agricultural education. Also, 58% of the extension agents had some preparation in agricultural economics. Another finding showed that 74% of extension agents held a college degree, 13% of them had a secondary diploma, and another 13% held an intermediate level certificate.

Only eight extension agents (25%) had experience in farming before they started their jobs. Seventy-five percent of the extension agents who had experience in farming held a college degree.

Another part of objective eight was to explain the relationship between the agricultural extension agents' major field of study and their years served as extension agents with farmers. Fourteen agents (approximately 45%) had ten years of experience or more. Eight of those 14 agents held college degrees. Also, nine of those 14 agents had some background in agricultural education. All extension agents who had two to nine years of experience held a college degree.

As to the number of years served as extension agents with wheat farmers, only three agents (10%) had ten years of experience with

wheat farmers. Those three agents held a college degree. Nineteen agents (61%) had served only one year or less with wheat farmers.

Findings Related to Objective Nine

Objective nine was to determine the relationship between selected demographic variables of wheat farmers' age, literacy, years of education, study of agriculture, years in farming, amount of land operated for wheat production, and the degree to which wheat farmers adopted selected wheat production and management practices recommended by agricultural extension agents. A Spearman correlation test was performed to determine this relationship.

The finding concerning this relationship showed that age of wheat farmers was negatively correlated with literacy, years of formal education, and study of agriculture. On the other hand, age of wheat farmers was correlated positively with years in farming. Literacy revealed a positive correlation with years in education, study of agriculture, presence of smut problems, and presence of weed problems in fields.

The factor of years in education was correlated positively with studying agriculture, using chemical fertilizer, and using manure fertilizer, while it was correlated negatively with years in farming. Study of agriculture was positively correlated with farm size and amount of land operated for wheat production, but correlated negatively with kilograms of seeds planted per donum.

Years in farming was correlated positively with soil condition. Farm size was found to be positively significantly correlated at the .01 level with amount of land operated for wheat production and kind of wheat, while it correlated negatively significant with kind of irrigation.

Finally, the amount of land operated for wheat production was positively correlated with kind of wheat while it was correlated negatively with kind of irrigation.

Findings Related to Objective Ten

Objective ten was to determine if the opinions of wheat farmers about agricultural extension agents was associated with the adoption of wheat practices by those farmers. In order to achieve this objective, 19 variables were examined. Those 19 variables were divided into two groups to determine if a relationship existed.

The first group consisted of 13 different opinions of wheat farmers about agricultural extension agents. Eight of these 13 opinions had means of 4.0 or above on five-point Likert scales. Five of them had means above 3.0 but less than 4.0. The lowest mean was 3.32 for the opinion "farmer trusts his fellow farmers' knowledge more than the local extension agents." On the other hand, the highest mean of 4.67 resulted for the opinion "farmer is willing to have extension agent conduct a demonstration field in his farm."

The second group contained six items. According to the kind of wheat used by wheat farmers, the finding was that 91.8% (67) used an improved variety. Another item examined in the second group was kilograms of seed planted per donum. The actual amount used by wheat farmers had been divided into six groups.

The first group ranged from 13-16 kilograms per donum. The last group ranged from 41-66 kilograms per donum. Only 4.1% (3) of wheat farmers were in the first group, which is the amount of seed per donum recommended by the Ministry of Agriculture in Saudi Arabia. Twenty-eight wheat farmers (34%) planted 17-20 kilograms per donum, which is very close to the recommended amount.

Forty-six wheat farmers (63%) planted wheat by hand. Thirty-three wheat farmers (45%) used sprinkler irrigation, while 40 (55%) used flood irrigation.

Findings Related to Objective Eleven

Objective eleven was an effort to gain insight into wheat farmers' perceptions of their level of innovativeness. Three Likert scale variables were used to gain this insight. There was not a strong sense of direction given by the farmers as to their perceived level of innovativeness.

Findings Related to Objective Twelve

Objective twelve was to determine if an association existed between the sources of information wheat farmers said that they used and those sources that agricultural extension agents said that they used to help wheat farmers learn about approved wheat production practices. Seven of the 12 sources of information were significantly different at the.01 level. Those seven sources of information were the group meeting, TV program, radio program, group demonstration, participation in field trip or tour, agricultural magazine, and the newspaper.

All nonsignificant sources of information were impersonal in nature. Those nonsignificant items were film, lecture, distributed posters, watched videotape about wheat practices, and bulletins.

Findings Related to Objective Thirteen

Objective thirteen was to determine if wheat farmers perceived that the relationship between themselves and agricultural extension agents had been beneficial to the farmers. Three Likert scale variables were examined. The means for all variables were above 3.0, with a mean of 4.16 (slightly stronger than "agree") being recorded for the relationship of being "productive."

Conclusions

Based on the findings of this study, the following conclusions were drawn:

1. Because it was found that a large number of agricultural extension agents did not study agricultural education as a major field of study, because a large number of extension agents had only one year or less of experience with wheat farmers, because it was found also that 75% of the extension agents had no experience in farming before they started their present jobs, and because 94% had no experience with wheat farmers before starting their present jobs, it was concluded that an intensive training program needed to be conducted for those agents in order for them to be capable of carrying out the mission of extension.

2. Because the mean of the wheat farmers was significantly higher than the mean of extension agents for the role of demonstrator expected of agents, it was concluded that extension agents did not perform this role at the level expected by the farmers.

3. Because it was found that a large number of wheat farmers operated small land holdings, and that a large number of wheat farmers did not own the agricultural implements considered necessary for their farms, it was concluded that as the extension personnel emphasize their efforts with small landholding farmers, that they should encourage farmers to own their agricultural implements in-so-far as it can be justified economically.

4. Most wheat farmers preferred to have neighbors as their sources of agricultural information. It was also found that a significant, positive relationship at the .01 level existed between the adoption of recommended farm practices and

the level of formal education, years in education, study of agriculture, farm size, and land operated for wheat production. Therefore, it was concluded that those who adopted the farm practices examined in this study were those who had the characteristics of a higher education, had studied agriculture, and had a large amount of land in wheat production.

5. Because there was not a strong sense of direction given by wheat farmers as to their level of innovativeness (means ranged from 3.14 to 3.86), and because no attempt was made to determine the actual innovativeness of wheat farmers, it was concluded that further research on this topic is needed.

6. Because there was no association between 7 of the 12 sources of information reported as being used by wheat farmers and those sources that extension agents said that they used, and because the wheat farmers used those sources to a much greater extent than extension agents did, it was concluded that the extension agents should use those seven sources to a greater extent if they expect to be effective in helping wheat farmers to accept improved technological practices. Those seven sources were the group meeting, TV program, radio program, group demonstration, participation in field trip and tour, watching videotape about wheat practices, agricultural magazines, and newspapers.

7. Because the means of three perceptions by wheat farmers pertaining to the degree to which the relationship between themselves and extension agents was beneficial ranged from 3.05 to 4.16 on a five-point scale, it was concluded that the relationship, while positive, was considered only slightly beneficial at best.

Implications

The purpose of this study was to synthesize existing information as perceived by wheat farmers and extension agents into a format useful to extension personnel in the Medina region. The strength of the synthesis was in bringing together the thinking of agricultural extension agents and wheat farmers to provide a sense of the degree to which there was commonality in perceptions of their relationships. Determining the quality of this relationship is critical to increasing agricultural production.

In this section an attempt was made to provide some implications for action based upon the findings. Results and conclusions from the study showed that extension agents shared information about wheat production practices informally. So, collaboration in technology transfer was lacking. Despite the assumption that extension agents who collaborate in the delivery of services to wheat farmers could be beneficial to regional development, the ways in which agents are achieving planned intervention to bring about increases in wheat production are not quite adequate. This may be especially true in the case of the Medina region whose farmers mostly operated small land holdings, and thus may have had limited access to extension services.

Extension administrators in the Medina region need to devote time and effort with respect to the nine roles expected of extension agents in which the means of wheat farmers were higher than the means of extension agents. Those are the roles of catalyst, answer giver, facilitator, evaluator, demonstrator, supervisor, publicize, experim-enter, and preventer. On the other hand, extension administrators do not need to devote extra time or effort on the other five roles expected of agents where the means of extension agents were higher than the means of the wheat farmers. Those five roles were legitimizer, technical expert, listener, deflector, and visitor.

The unexpected result among these 14 roles was the finding for the role of demonstrator. This should have been reported with a higher mean by the extension agents, while the results showed that the mean of wheat farmers was higher than the mean of extension agents. An implication exists that this result might have happened because of lack of understanding of the importance of the demonstration role by extension agents in the Medina region because their technical preparation was in general agriculture for the most part and they had not had extensive training in agricultural extension methods. In fact, only one extension agent had studied agricultural extension as a major field of study.

Evidence from the Medina region during the time of investigation showed that some of the extension agents concentrated services on farmers with large landholdings. The result is that large landholding farmers were the main beneficiaries, while small landholding farmers received relatively less attention. The overall implication is that inequities in agricultural services provided to wheat farmers by extension agents are linked to inequities in farmers' productive capabilities.

The data showed that a large number of wheat farmers (83.6%) received their information about agriculture from their neighbors. This may reflect the feeling that wheat farmers appreciate their knowledge of agriculture more than the knowledge of extension agents. However, farmers' knowledge can be used to guide researchers, developers, and extension agents in the direction most needed to assist farmers. In other words, the implication exists that extension researchers, developers, and agents should work with, not against, farmers' knowledge.

Because of the finding that wheat farmers reported using their neighbors to a greater extent for information about wheat farming practices than they reported going to extension agents, and because previous research points out that opinion leaders among wheat

farmers are sought out most often for information, therefore, an implication exists that extension agents need to identify the opinion leaders among the farmers and work closely with those opinion leaders to make them aware of acceptable or approved wheat farming practices as a means of speeding up the diffusion of knowledge about approved wheat farming practices among farmers.

The data showed that some of the perceptions of expected roles of agricultural extension agents were considered more favorably in the perceptions of wheat farmers than in the perceptions of extension agents. This possibly is due to the lack of understanding of extension services. Another possibility is that because of the small number of extension agents who had an extension education component or option in their major field of study, agents, generally, had not received training or been imbued with the philosophy that would have resulted in their responding with higher means as to the roles expected of them.

The data also showed that, in general, low correlations existed between selected variables and selected adoption scores. These might be caused by a factor such as a low perception by wheat farmers of how beneficial was the relationship between extension agents and wheat farmers. Another reason might be wheat farmers' valuing their knowledge over that of extension agents. However, it is difficult to identify the exact causes or reasons to which this finding can be attributed.

The results of this study generally confirm that agriculture in Saudi Arabia is becoming more technological, more special-ized, and more efficient. If the extension agents' roles as seekers and disseminators of knowledge are valid, then the farmers might learn different approaches. However, learning must be more than presenting materials. It must motivate farmers by providing positive guidance for action, not simply provide a transfer of information. The only real value of knowledge is when farmers can use it in a meaningful way.

In order to increase food production, extension agents must use a variety of techniques to teach farmers according to their needs and

their level of agricultural knowledge. Also, extension agents must have technical expertise in the field of wheat production. However, agricultural production should be increased in such a manner that will conserve the natural resource base and that will benefit significantly the small landholders.

Farmers believed that extension agents were credible and that they would have recommended that their close relatives be extension agents. However, they did not report using agents as primary sources of information, and they were in contact with agents were who considerably younger on the average. Consequently, an implication exists that agents need to work not only with identified opinion leaders among farmers but also to identify those farmers who have higher levels of education and work with them, even if they are younger farmers.

Finally, extension agents should work very hard to gain credibility with wheat farmers and to enhance the degree of relationship with them which was found, in the final analysis, only slightly beneficial at best.

Recommendations

Aside from the findings and conclusions of this study, it is necessary to acknowledge gratefully the effort of agricultural extension agents in increasing agricultural production in the Medina region. There is no doubt also that they will continue to strive hard to "modernize" extension services and activities that reach, and thus help, the farmers.

Extension administration and staff development personnel at the Department of Extension at the Ministry level should consider carefully the possibility of expanding extension services as a vehicle to increase agricultural production. The big question now is whether or not extension services in the Medina region receive equal consideration with those in other regions.

Making such a determination may need to be the focus of further research. If it, or any other region, is found to receive a lesser level of services, consideration should then be given as to how to provide the appropriate services necessary to catch the wheel of development as soon as possible. The role extension agents play in every region will affect the future of agricultural production in the Kingdom of Saudi Arabia.

Two categories of recommendations are presented for consideration by the reader.

I. Recommendations for Action

The following recommendations for action made by this investigator for the extension system in the Medina region of Saudi Arabia are based on the findings and conclusions of this study:

1. More research needs to be conducted in the Medina region in the area of training and teaching extension agents about techniques of agricultural extension in the times of rapid change.

2. The extension system in the Medina region can best be improved by building upon the existing system rather than trying to replace it, and by merging the best aspects of traditional ways with the contributions of modern science.

3. Extension agents should consider redirecting their services more toward small farmers while not neglecting large farmers.

4. The content and experience provided in the curriculum of agricultural colleges and institutes should be as relevant to the needs of farmers' social and economic environment as is possible. Farmers and extension agents should be regularly consulted for suggestions for improving the study of agriculture to meet their needs. Doing so will help prepare extension agents better for helping farmers.

5. Because such a low level of experience in farming was possessed by extension agents, it is important that such agents receive as much training as is necessary in formal programs of instruction in agricultural colleges and institutes to make them credible in the eyes of the farmers.

II. **Recommendations for Further Research**

The following recommendations for further research, stated as questions, are based on the findings and conclusions of this study and upon the experiences encountered by the investigator during the course of study:

1. What are the relationships between agricultural extension agents and wheat farmers or farmers in general in the other regions of Saudi Arabia?

2. What are the relationships between agricultural extension agents and other (non-wheat-growing) farmers in the Medina region?

3. What are the perceptions of graduates of agricultural colleges and institutes in regard to the importance of the relationship between extension agents and farmers?

4. What influence do private sector agricultural extension agents have on increasing agricultural production in the Medina region?

5. Why does a low correlation value exist between the selected characteristics examined in this study and the self-reported adoption of approved wheat production practices by farmers?

6. What caused the results of higher means of wheat farmers as to the roles expected of agricultural extension agents in comparison with the means of extension agents examined in this study?

7. Do farmers seek advice from extension agents who have more years of actual experience in farming to a greater extent than they do from agents who have not had much experience in farming?

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